

I. Claim Rejection Under 35 U.S.C. § 103(a)

Claims 1-4 and 9-20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,159,656 to Kawabe et al. (Kawabe et al.) with U.S. Patent No. 6,174,661 B1 to Chen et al. (Chen et al.) wherein Chen et al. is cited to support the Examiner's position that "Florad FC430" and "FC431" are fluorinated alkyl esters. Applicants respectfully traverse this rejection.

In order to establish a *prima facie* case of obviousness, three basic criteria must be met. First, the prior art reference or combination of references must teach or suggest all the claim recitations. *See In re Wilson*, 165 U.S.P.Q. 494 (C.C.P.A. 1970). Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings in order to arrive at the claimed invention. *See In re Oetiker*, 24 U.S.P.Q.2d 1443, 1446 (Fed. Cir. 1992); *In re Fine*, 837 F.2d at 1074; *In re Skinner*, 2 U.S.P.Q.2d 1788, 1790 (Bd. Pat. App. & Int. 1986). Third, there must be a reasonable expectation of success. *See* M.P.E.P. § 2143. Applicants respectfully submit that the Final Action has failed to establish a *prima facie* case of obviousness.

A. Claims 1, 3, and 17

The Final Action states that "since Kawabe teaches that the nonionic surfactant is being added for the purpose of improving the applicability of the photoresist composition and improving the developability, it is the Examiner's position that the present range for the amount of the non-ionic surfactant would have been obvious to one skilled in the art because it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art." Final Action, page 3 (citation omitted). Applicants respectfully disagree.

Applicants respectfully submit that the positive photosensitive resin of Kawabe et al. has been mischaracterized in the Final Action. The Final Action states that Kawabe et al. teaches a positive resist composition which comprises "a polymer, a solvent, and at least one of a fluorine type surfactant and a silicone type surfactant." Final Action, page 2-3. The Final Action also asserts that "Kawabe also teaches that a nonionic surfactant can be further added for the purpose of improving the applicability of each photosensitive resin composition

of his invention or improving developability.” Final Action, page 3. However, in contrast to the present invention, Kawabe et al. is unclear with respect to the specific combination that results in the photosensitive resin composition upon addition of the nonionic surfactant. More specifically, Kawabe et al. does not disclose a resist material comprising one or more surfactants having a fluorine substituent and between 10 and 2000 ppm of a non-ionic surfactant comprising one or more non-ionic surfactants having neither a fluorine substituent nor a silicon-containing substituent as recited in Claim 1. Kawabe et al. does not disclose a resist material comprising at least one resin, at least one solvent, at least one surfactant having a fluorine substituent, and at least one non-ionic surfactant having neither a fluorine substituent nor a silicon-containing substituent, wherein the at least one non-ionic surfactant is present in the resist material in an amount between 10 ppm and 2000 ppm as recited in Claim 17. Moreover, Kawabe et al. fails to teach or suggest the specific combination as recited in Claims 1 or 17. Thus, the positive or negative resist materials of the present invention and as recited in the claims are distinct from the positive photosensitive resin composition of Kawabe et al.

Applicants further submit that the present range for the amount of the non-ionic surfactant would not have been obvious to one skilled in the art based upon the proposal set forth by Kawabe et al. Kawabe et al. fails to recognize the result-effective capability of the nonionic surfactant. At column 44, lines 64-67, Kawabe et al. merely asserts that “[a] nonionic surfactant can be further added for the purpose of improving the applicability of each photosensitive resin composition of the present invention or improving developability.” Kawabe et al. is silent on the effects of the addition of a nonionic surfactant, in a composition as disclosed in the present invention, to improve poor coating properties, to suppress the occurrences of microbubbles in solution, and to lower the occurrences of a variety of defects causing the yield reduction in the device manufacturing step. Such is explained in detail in the present application at page 2, line 18 through page 3, line 21. Thus, Applicants submit that, in contrast to the assertions of the Final Action, no reasonable expectation would exist of optimizing the range for the addition of the nonionic surfactant to successfully yield the resist material of the present invention. It is only in view of the present invention that provides specific combinations and an appreciation of the effects of the present invention as discussed

present purpose

above is one of ordinary skill in the art able to practice the present invention. Applicants note that Chen et al. does not cure the deficiencies of Kawabe et al.

Therefore, where Kawabe et al. fails to disclose the positive or negative resist material of the present invention, Kawabe et al. fails to teach or suggest the positive or negative resist material of the present invention, and lastly, Kawabe et al. fails to recognize the result-effective capability of the combination as recited in the claims of the present invention, and thus, fails to provide a reasonable expectation of success of arriving at the present invention and such deficiencies are not cured by Kawabe et al., Applicants submit that the Final Action fails to establish a *prima facie* case of obviousness.

Thus, Claims 1, 3, and 17 are patentable under 35 U.S.C. § 103(a) over Kawabe et al., alone or in combination with Chen et al.

B. Claims 2, 4, and 18

The Final Action asserts that one of ordinary skill in the art would envisage using the nonionic surfactants as presently claimed as the nonionic surfactant employed in Kawabe et al. See Final Action, page 4. Applicants respectfully disagree with this assertion.

For the reasons set forth above, Kawabe et al. fails to recognize the result-effective capability of the combination as recited in the claims of the present invention. Thus, although Kawabe et al. proposes that certain nonionic surfactants may be employed, merely citing examples of nonionic surfactants does not provide a reasonable expectation of success of arriving at the present invention. As previously stated, it is clear that Kawabe et al. fails to disclose the positive or negative resist material of the present invention, fails to teach or suggest the positive or negative resist material of the present invention, and fails to provide a reasonable expectation of success of arriving at the present invention rendering Claims 1, 3, and 17 patentable under 35 U.S.C. § 103(a) over Kawabe et al. As such, Claims 2, 4, and 18, which are dependent therefrom, are also patentable under 35 U.S.C. § 103(a) over Kawabe et al.

C. Claims 13-16

The Final Action states that "Kawabe et al. teaches that his photosensitive resin composition is applied on a substrate, and the coating film is subjected to pre-bake and then exposed to an exposure light having a wavelength of 220 nm or shorter through a given mask. The film is subjected to post-exposure bake and then developed to obtain a satisfactory resist

pattern." Final Action, page 4. In contrast, the present invention discloses a method as recited in Claim 13.

13. A method for forming a pattern on a substrate comprising:
coating a resist material on a substrate, the resist material comprising one or more surfactants having a fluorine substituent and between 10 and 2000 ppm of a non-ionic surfactant comprising one or more non-ionic surfactants having neither a fluorine substituent nor a silicon-containing substituent;
subjecting the substrate to heat to treat the substrate;
exposing the substrate through a photomask to radiation selected from the group consisting of high energy radiation having a wavelength of 500 nm or less, X-ray radiation, and electron beam radiation;
optionally heat treating the substrate; and
developing the substrate in a developing solution.

The method proposed by Kawabe et al. is distinct from the method of Claim 13. As noted above, and as can be readily ascertained from the recitations of Claim 13, the positive or negative resist material of the present invention employed in the method of Claim 13 is distinct from the positive photosensitive resin composition of Kawabe et al. employed in the method proposed by Kawabe et al. Moreover, Kawabe et al. does not teach or suggest, among other things, that the substrate is exposed through a photomask to radiation selected from the group consisting of high energy radiation having a wavelength of 500 nm or less, X-ray radiation, and electron beam radiation as recited in Claim 13. Applicants submit that where the materials employed in the method of Kawabe et al. and the actions taken in the method of Kawabe et al. differ from the those of the present invention and Kawabe et al. does not teach or suggest the method as recited in Claim 13, Kawabe et al. does not render Claim 13 obvious. As such, Claims 14-16, which depend directly or indirectly therefrom, are patentable under 35 U.S.C. § 103(a) over Kawabe et al.

D. Claims 9 and 19

Claim 9 depends from Claim 1 and Claim 19 depends from Claim 17. For similar reasons as set forth above in Section I.A., Applicants submit that Claims 9 and 19 are patentable under 35 U.S.C. § 103(a) over Kawabe et al.

E. Claim 10

Claim 10 depends from Claim 1. For similar reasons as set forth above in Section I.A., Applicants submit that Claim 10 is patentable under 35 U.S.C. § 103(a) over Kawabe et al.

F. Claims 11, 12, and 20

The Final Action states that “since Kawabe teaches that the nonionic surfactant is being added for the purpose of improving the applicability of the photoresist composition and improving developability, it is the Examiner’s position that the present range for the weight ratio would have been obvious to one skilled in the art since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.” Final Action, page 5-6 (citation omitted). Applicants respectfully disagree.

The Final Action acknowledges that “Kawabe does not explicitly disclose the weight ratio of the non-ionic surfactant to the fluorine surfactant.” Final Action, page 5. Moreover, as set forth above in Section I.A., Kawabe et al. is silent on the effects of the addition of a nonionic surfactant, in a composition as disclosed in the present invention, to improve poor coating properties, to suppress the occurrences of microbubbles in solution, and to lower the occurrences of a variety of defects causing the yield reduction in the device manufacturing step as explained in the present application at page 2, line 18 through page 3, line 21. Thus, Kawabe et al. fails to teach or suggest the weight ratio of the non-ionic surfactant to the fluorine surfactant, fails to recognize the result-effective capability of the invention as recited in the claims of the present invention, and fails to provide a reasonable expectation of success of arriving at the present invention. Thus, Applicants submit that Claims 11, 12, and 20 are patentable under 35 U.S.C. § 103(a) over Kawabe et al.

G. Claims 1-4 and 9-20

With respect to Claims 1-4 and 9-20, the Final Action reiterates the assertion regarding the alleged obviousness of the present range for the amount of the non-ionic surfactant. See Final Action, page 6. As previously noted, Kawabe et al. merely asserts that a nonionic surfactant can be added for the purpose of improving the applicability or developability of the photosensitive resin composition. Kawabe et al. is silent on the effects of the addition of a nonionic surfactant, in a composition as disclosed in the present invention, to improve poor coating properties, to suppress the occurrences of microbubbles in

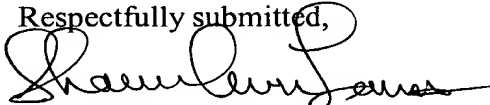
solution, and to lower the occurrences of a variety of defects causing the yield reduction in the device manufacturing step as explained in the present application at page 2, line 18 though page 3, line 21. Thus, Applicants submit that, in contrast to the assertions of the Final Action, no reasonable expectation would exist of optimizing the range for the addition of the nonionic surfactant to successfully yield the resist material of the present invention. It is only in view of the present invention that provides specific combinations and an appreciation of the effects of the present invention as discussed above is one of ordinary skill in the art able to practice the present invention. Thus, Applicants submit that Claims 1-4 and 9-20 are patentable under 35 U.S.C. § 103(a) over Kawabe et al.

Accordingly, Applicants respectfully submit that Claims 1-4 and 9-20 are patentable under 35 U.S.C. § 103(a) over Kawabe et al., alone or in combination with Chen et al., and request that this rejection be withdrawn.

II. CONCLUSION

With the concerns of the Examiner addressed in full, Applicants respectfully request entry of this Amendment, withdrawal of the outstanding rejections, and the issuance of a Notice of Allowance forthwith. The Examiner is encouraged to direct any questions regarding the foregoing to the undersigned, who may be reached at (919) 854-1400.

Respectfully submitted,



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Vickie Diane Prior

Version With Markings To Show Changes Made

In the Claims:

Please amend the claims to recite as follows:

9. (Amended) A resist material according to claim 1 wherein said one or more surfactants having a fluorine substituent is selected from the group consisting of perfluoroalkylpolyoxyethylene ethanol, fluorinated alkyl ester, perfluoroalkylamine oxide, perfluoroalkylethylene oxide adduct, and fluorine-containing organosiloxane compounds.